

# Notice of Allowability

Application No.

10/085,750

Examiner

John B. Strege

Applicant(s)

THORNER ET AL.

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed 4/7/05.

2. ☒ The allowed claim(s) is/are 1-4 and 9-19.

3. ☐ The drawings filed on \_\_\_\_\_ are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some\* c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.

(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached

1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.

(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date 2/28/02

4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_

7. ☒ Examiner's Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other \_\_\_\_\_

### DETAILED ACTION

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Paul Esatto on 7/23/05.

In the claims:

Please cancel claims 5-8.

### ***Election/Restrictions***

Claims 5-8 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 4/7/07. New claims 9-19 have been entered.

### ***Allowable Subject Matter***

1. Claims 1-4, and 9-19 are allowed.
2. The following is an examiner's statement of reasons for allowance: Regarding claim 1, none of the prior art explicitly disclose in combination with the other limitations of the claim

Deriving a reflectance function that describes an approximation of the set of all possible rendered images that each three dimensional model can produce under all

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possible lighting conditions, wherein said reflectance function analytically excludes illumination within cast shadows on said model; and optimizing the reflectance function to determine an optimal rendered image of each model that is most similar to the input image. The closest prior art is Georghiades et al. *Illumination Cones for Recognition Under Variable Lighting: Faces* (hereinafter "Georghiades"). Georghiades discloses modeling cast shadows for use in facial recognition, however does not disclose the limitations cited above. Claims 2-4 are dependent on claim 1, thus are allowable for the same reasons.

Regarding claim 9, none of the prior art discloses a method of image recognition of an input image comprising:

Generating a set of harmonic images for the three-dimensional model, approximating the reflectance on the candidate object when illuminated by a harmonic light, said reflectance analytically excludes illumination within cast shadow on said three dimensional model and selecting a candidate image by seeking a vector of harmonic coefficients that minimizes the difference between the input image and the candidate image. The closest prior art is Mukaigawa et al. *Photometric Image-Based Rendering for Image Generation in Arbitrary Illumination* (hereinafter "Mukaigawa"). Mukaigawa discloses using photometric linearization involving separating cast shadows (section 3.2) and as seen in figure 7 discloses principal component images. Mukaigawa does not explicitly disclose using the method for image recognition and further does not disclose seeking a vector of harmonic coefficients that minimizes the difference between the input image and the candidate image. Thus claim 9 is allowable over the

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prior art. Claims 10-19 are dependent on the allowable claim 9 thus are allowable for the same reason.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John B. Strege whose telephone number is (571) 272-7457. The examiner can normally be reached on Monday-Friday between the hours of 8-5.

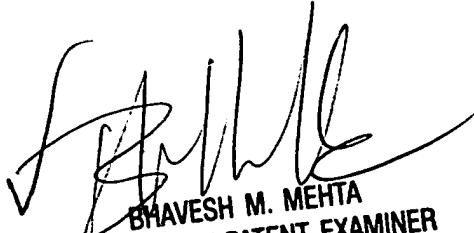
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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